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Date of signature and deposit/transmission: October 19, 2004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Syun Kyung Lee	)	Group Art Unit 3611
Serial No. 09/683,941	)	Examiner: Lum, Lee S.
Filed: March 5, 2002	)	Attorney Docket 201-0148 (16372)
For: FOUR WHEEL DRIVE ASSEMBLY AND A METHOD FOR UTILIZING THE SAME	)	

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL LETTER

Sir:

Enclosed for filing in the application identified above is an Appeal Brief in triplicate. This Appeal Brief is submitted in response to a Notice of Non-Compliance with 37 CFR 1.192 (c), dated September 20, 2004.

Respectfully submitted,

/FGMcKenzie/

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APPEAL BRIEF

Sir:

This is an appeal from a final rejection of the application, dated September 5, 2003.

REAL PARTY IN INTEREST

Ford Global Technologies, LLC, a wholly owned subsidiary of Ford Motor Company, a Delaware Corporation, is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no other related appeals or interferences known to appellant, the appellant's legal representative or assignee that will affect, be affected by, or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

The claims involved in this appeal are claims 1-17. Each of these claims received a final rejection in the Office action dated September 5, 2003.

Claims 18-20 have been cancelled.

STATUS OF AMENDMENTS

The amendment filed on January 5, 2004, after the final rejection, was not entered.

SUMMARY OF CLAIMED SUBJECT MATTER

The invention comprises a four-wheel drive assembly for a vehicle 12 having a front pair of wheels 18, 18', supported on front axle shafts 14, 15; and a rear pair of wheels 19, 19', supported on rear axle shafts 16, 17. The vehicle 12 includes an accelerator pedal 55, and a power source, an internal combustion engine 20 controlled by an engine throttle 53. A torque transfer assembly 60 adjustably distributes to the front and rear wheels the torque, which is produced by the engine 20 and is transmitted to the input 70 of the assembly 60. A front driveshaft 34 and rear driveshaft 36 connect the front and rear wheels, respectively, to the torque transfer assembly 60. A controller 62 receives signals representing the speed of the front and rear wheels, the extent to which the accelerator pedal 55 is depressed, and the position of the engine throttle plate 53. The controller 62 produces an output that causes the magnitude of torque transmitted to the wheels to change on the basis of control logic executed by the controller. A purpose of the control is to reapportion the magnitudes of torque transmitted to the wheels in order to prevent the wheels from slipping, to reduce the likelihood of wheel slippage, or to correct for wheel slippage.

Figure 2 is a flowchart of the control logic 100. At step 104, the controller 62 enters a slip detection and control mode. At step 106, the controller 62 determines whether wheel slip is occurring by comparing the current speed of the driveshafts 34, 36, or the first pair of axles 14, 15 and second pair of axles 16, 17, or the first pair of wheels

18, 20 and second pair of wheels 22, 24. If any of these the speed differences exceeds a predetermined reference or threshold speed difference, then a slip condition exists. At step 108, slip control corrective action is taken by increasing the magnitude of torque transmitted by the torque transfer assembly 60 to the slower pair of wheels.

At step 109, controller 62 determines whether the preemptive slip control mode flag is currently set to a non-zero value or a logically true state, or whether it is necessary to enter the preemptive slip control mode, as determined by criteria described in the application. A criterion for this determination is whether the speed difference is equal to or greater than 2.0 km/hr. If preemptive slip control mode is required or the flag is set, the controller 62 enters a preemptive slip control mode 110, and the preemptive slip control flag is set.

At step 112, the controller 62 uses the speed of the wheel pairs, the position of the accelerator member 55, and/or the throttle plate 53 to determine whether wheel slip is likely to occur. For example, if vehicle speed is low (about 20 miles per hour) and the position of the accelerator pedal 55 or the throttle plate 53 is greater than about half-way toward their respective fully applied or maximum torque request position, the controller 62 concludes that slip is likely to occur. Then at step 114, the controller again reallocates torque to the wheel pairs by increasing torque to the slower of the wheel pairs. Control passes then to step 115 where the speed difference of the wheel pairs is compared to a reference speed difference. If the actual speed difference is greater than the reference, slip is determined to exist, and the controller returns to step 108 where torque is again increased to the slower wheel pair. But if slip is absent when tested at step 115, control passes from step 115 to step 112 to determine again whether wheel slip is likely to occur. This process continues until step 112 becomes logically false, indicating that slip is unlikely to occur. Thereafter, at step 116, several criteria are used to decide whether to exit the preemptive mode. If so, the control returns to step 106; if not, control returns to step 112.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-8 and 10-17 stand rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. In Claims 1-8 the term "preemptive mode" is considered unclear by the Examiner because it is not described in the claims. This rejection of Claims 1-8 and 10-17 is an issue in this appeal.

Claims 1-8 stand rejected under 35 U.S.C. 102(b) as being anticipated by Showalter (U.S. Patent 5,704,444). This rejection of Claims 1-8 is an issue in this appeal.

Claims 9-17 stand rejected under 35 U.S.C. 102(b) as being anticipated by Showalter (U.S. Patent 5,704,444) in view of Hiwatashi (U.S. Patent 6,094,614). It is an issue in this appeal whether this rejection of Claims 9-17 is proper under 35 U.S.C. 102(b).

ARGUMENT

Rejection of Claims 1-8 under 35 U.S.C. § 112, second paragraph

Claims 1-8 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to describe "preemptive mode" in these claims. The preemptive mode of operation is described in the specification at paragraph [0031] through paragraph [0034].

The preemptive mode is entered at step 110 after determining whether step 109 sets a flag that alerts the controller to execute step 110. After beginning the preemptive mode of operation, at step 112 the controller refers to vehicle speed (represented by axle speed or driveshaft speed) and to engine output (represented by the position of the engine throttle plate 53 or the position of the accelerator pedal 55) to determine whether the vehicle wheels are likely to slip. For example, if the vehicle speed is slow and a current demand for engine output is high, the wheels are likely to slip.

If wheel slip is likely to occur, at step 114, torque to the forward and rear wheels is changed so that torque is increased to the slower wheels. If the check at 112 shows that

wheel slip is unlikely, then the preemptive mode is terminated at step 116, provided certain conditions are satisfied.

After torque is increased to the slower wheels, a check is made at step 115 to determine whether the wheels are currently slipping. If the wheels are slipping, torque is again increased to the slower wheels at 108, and a check is made at 109 to determine whether to remain in the preemptive mode. If, at step 115, the wheels are not slipping, the check of step 112 is repeated to determine whether the wheels are likely to slip as discussed above.

The specification clearly discloses this "preemptive mode." Claims 1-8 clearly refer to this preemptive mode and satisfy the requirements of the second paragraph of 35 U.S.C. 112.

Rejection of Claims 1-8 under 35 U.S.C. § 102(b)

Claims 1-8 stand rejected under 35 U.S.C. § 102(b) as anticipated by Showalter (U. S. Patent 5,704,444). Claim 1 of the subject application says that the torque transfer assembly increases torque to a slower pair of wheels when a sensed slip condition occurs. The Showalter patent shows in its Figure 6, steps 314 and 318, at which two slip conditions are tested to determine whether they exceed a predetermined threshold. If both conditions are met, at step 322 torque is increased through clutch 150 to 100 percent of its torque transmitting capacity. Step 322 causes full engagement of clutch 150 and transmits torque to both the front wheels and rear wheels, without regard to the relative speed of the wheel pairs. When the system of the Showalter patent detects slip, it transmits approximately 50 percent of the total torque to each of the front wheels and rear wheels. Showalter does not disclose increasing torque to the slower wheels upon sensing a slip condition, as the claims define the present invention.

The Examiner concludes that by connecting both the front and rear wheels to the input torque, Showalter's system increases torque to the slower wheel pair. But

Showalter merely locks the transfer case clutch, reducing torque to the rear wheels and increasing torque to the front wheels. The Showalter system disregards the relative speed of the wheel pairs for purposes of reallocating torque after detecting slip. The Showalter system may decrease, rather than increase torque, to the slower of the wheel pairs. It is a purpose of the present invention to reduce wheel slip by increasing torque to the slower wheels because the slower speed indicates that the slower wheels are better able to maintain traction contact on a road surface than the faster wheels.

There is no teaching in the cited references of a preemptive control mode that occurs after detecting slip and increasing torque to the slower wheels. Claim 1 recites a preemptive mode in which the torque transfer assembly increases torque to a slower pair of wheels after determining that a slip condition is likely to occur, on the basis of vehicle speed and the position of one of an accelerator member and an engine throttle plate.

Neither Showalter nor any other cited reference teaches increasing the magnitude of torque to the slower wheel pair after detecting a slip condition. Neither Showalter nor any other cited reference teaches a preemptive mode. The claims should not be rejected under 35 U.S.C. § 102(b) as anticipated by Showalter.

Claim 2 is distinguished also from the prior art because it adds to Claim 1 a condition for terminating the preemptive mode. Claim 3 limits the condition of claim 2 to a period of thirty seconds. Claim 4 references a further limitation on the preemptive mode. Claims 5-8 add additional limitations on the preemptive mode set forth in Claim 1. None of these limitations is present in the cited references. For these reasons, Claims 2-8 are independently patentable, both mutually and from Claims 1, 9 and 11-17.

Rejection of Claims 9-17 under 35 U.S.C. § 102(b) 103a

Claims 9-17 stand rejected under 35 U.S.C. § 102(b) as anticipated by Showalter in view of Hiwatashi (U. S. Patent 6,094,614). The Examiner concedes that no reference teaches the invention defined by Claims 9-17, and implies that Claims 9-17 are not

anticipated. It is improper to reject a claim under 35 U.S.C. § 102(b) unless the claim was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States. There is no patent, publication, public use or on-sale bar cited in the Office action that would support this rejection. The Office action has not met the provisions required to reject Claims 9-17 under 35 U.S.C. § 102(b).

In rejecting Claims 9-17 under 35 U.S.C. § 102(b) the Office action states no connection between Showalter and Claims 9-17 except for a general statement that those claims are rejected under 35 U.S.C. § 102(b) as anticipated by Showalter. The Office action does not explain or suggest how the strategy of Hiwatashi could be combined with the control of Showalter. The Office action cites no suggestion in either Showalter or Hiwatashi for combining the references.

Presumably at least part of the basis for this rejection is the same rationale as was used to reject Claims 1-8, viz., that connecting both the front and rear wheels to the input torque is equivalent to increasing torque to the slower wheel pair. Claims 9 and claims 10-17, which depend from Claim 9, recite that the controller torque transfer assembly increases torque to a slower pair of wheels after a slip condition is sensed and after sensing that the wheels are on a surface having a low coefficient of friction. Showalter merely locks the transfer case clutch, thereby reducing torque to the rear wheels and increasing torque to the front wheels. The control of Showalter may actually decrease torque transferred to the slower of the wheel pairs. Neither Showalter nor any other cited reference teaches increasing the magnitude of torque to a slower wheel pair after detecting a slip condition. Claims 9 and 11-17 should not be rejected under 35 U.S.C. § 102(b) as anticipated by Showalter or Hiwatashi.

Claim 11 is distinguished also from the prior art because it adds to Claim 9 the limitation of a preemptive slip mode of operation, which is absent from any cited reference. Claim 12 adds to Claim 11 limitations pertaining to the predetermined condition, a combination that is absent from any cited reference. Similarly, the

limitations of Claims 13-17 add further limitations to those of Claim 12. For these reasons, Claims 11-17 are patentable independently, both mutually and with respect to Claims 1-8 and 9.

Respectfully submitted,

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CLAIMS APPENDIX

1. (Rejected) A four wheel drive assembly for a vehicle having two pairs of wheels comprising a torque transfer assembly which receives torque and which has a first mode of operation in which said torque transfer assembly selectively increases torque to a slower pair of wheels upon a sensed slip condition, and which assembly further has a preemptive mode of operation which occurs only after the first mode of operation has occurred.

2. (Rejected) The four wheel drive assembly of Claim 1 wherein said preemptive mode terminates after a certain period of time has elapsed without an occurrence of a sensed slip condition.

3. (Rejected) The four wheel drive assembly of Claim 2 wherein said certain period of time comprises about thirty seconds.

4. (Rejected) The four wheel drive assembly of Claim 3 wherein said preemptive mode again occurs upon a sensed occurrence of a slip condition after said certain period of time.

5. (Rejected) The four wheel drive assembly of Claim 1 wherein said preemptive mode terminates upon an attainment of a certain vehicular speed and an attainment of a certain value for a predetermined attribute.

6. (Rejected) The four wheel drive assembly of Claim 5 wherein said certain vehicular speed comprises a speed of about twenty-five kilometers per hour.

7. (Rejected) The four wheel drive assembly of Claim 6 wherein said predetermined attribute comprises a difference in a speed of a first axle and a speed of a second axle.

8. (Rejected) The four wheel drive assembly of Claim 7 wherein said certain value comprises about two kilometers per hour.

9. (Rejected) A four wheel drive assembly for a vehicle having two pairs of wheels comprising a torque transfer assembly; and a controller which is coupled to said torque transfer assembly and which senses the wheels being on a surface having a low coefficient of friction, and which controller increases torque to a slower pair of wheels upon a sensed slip condition after the presence of said surface is sensed.

10. (Rejected) The four wheel drive assembly of claim 9 wherein said controller senses the wheels being on said surface by sensing an occurrence of a slip condition.

11. (Rejected) The four wheel drive assembly of Claim 9 wherein a preemptive slip control mode of operation, in which the torque transfer assembly increases torque to a slower pair of wheels after determining that a slip condition is likely to occur on the basis of a speed of the vehicle and a position of one of an accelerator member and an engine throttle plate, ceases upon an occurrence of a predetermined condition.

12. (Rejected) The four wheel drive assembly of Claim 11 wherein said predetermined condition comprises a certain vehicular speed in combination with a certain wheel speed value.

13. (Rejected) The four wheel drive assembly of Claim 12 wherein said certain vehicular speed comprises about twenty-five kilometers per hour.

14. (Rejected) The four wheel drive assembly of Claim 13 wherein said certain wheel speed value comprises a difference between a speed of at least one front wheel and a speed of at least one rear wheel.

15. (Rejected) The four wheel drive assembly of Claim 14 wherein said difference comprises less than about two kilometers per hour.

16. (Rejected) The four wheel drive assembly of Claim 15 wherein said preemptive mode terminates after a certain period of time.

17. (Rejected) The four wheel drive assembly of Claim 16 wherein said certain period of time comprises about thirty seconds.

18. (Canceled)

19. (Canceled)

20. (Canceled)